Air Quality Permitting
Statement of Basis

May 6, 2005

Tier II Operating Permit
No. T2-040323

Nu-West Industries, Inc., dba Agrium, Conda Phosphate Operations, Dry Valley Mine
Soda Springs

Facility ID No. 029-00027

Prepared by:

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AIR QUALITY DIVISION

FINAL PERMIT

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Acronyms, Units, and Chemical Nomenclature

acfm	actual cubic feet per minute
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
Btu	British thermal unit
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	Environmental Protection Agency
gr	grain (1 lb = 7,000 grains)
HAPs	hazardous air pollutants
hp	horsepower
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometer
lb/hr	pound per hour
MMBtu	million British thermal units
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
PM	particulate matter
PM_{10}	particulate Matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
PTE	potential to emit
Rules	*Rules for the Control of Air Pollution in Idaho*
SIC	Standard Industrial Classification
SO_2	sulfur dioxide
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01 Section 404.04, *Rules for the Control of Air Pollution in Idaho* (*Rules*) for Tier II operating permits.

2. FACILITY DESCRIPTION

The Dry Valley Mine, owned and operated by permittee Nu-West Industries, Inc., dba Agrium Conda Phosphate Operations (Agrium), consists of two existing or proposed open pits C & D, which are or will be mined using excavators, 150-ton dump trucks and other support equipment. The Dry Valley Mine operations addressed by this permit also include the backfilling and reclamation work to be performed by Agrium in the Pit B area, as well as the office and maintenance building and related adjacent support facilities. The overburden will either be placed in the mined-out pits or in external overburden dumps. The mined phosphate ore will be hauled to a stockpile area next to the railcar loading area which is generally called a tipple. Next, the phosphate ore is moved from the stockpile area to the conveyor system with front-end loaders and bulldozers. If needed, the rotary impact crusher and associated material handling equipment may be used to reduce the size of the ore. The ore will then pass over a 4-inch screen before being loaded into railcars. A boiler is used to provide space heating for the offices and shop. Specific information is provided below in Section 5.

3. FACILITY / AREA CLASSIFICATION

The Dry Valley Mine is not a major facility as defined in IDAPA 58.01.01.008.10. This mine is not a designated facility as defined in IDAPA 58.01.01.006.27 and it is not a phosphate rock processing plant. The Dry Valley Mine is classified as a minor source because the actual and potential emissions of regulated air pollutants are less than 100 T/yr.

The facility is located within AQCR 61 and UTM zone 12. The facility is located in Caribou County which is designated as attainment or unclassifiable for all criteria pollutants (*CO*, NO_x, SO_2, lead, and ozone).

The AIRS information provided in Appendix C defines the classification for each regulated air pollutant at the Dry Valley Mine. The AIRS facility classification was changed to B. This required information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

This permit action is for the issuance of a new Tier II permit, due to the a transfer of ownership of the noted portions of the Dry Valley Mine from Astaris Productions, LLC (Astaris) to Agrium. This permit was originally issued to Astaris on June 13, 2002. On May 24, 2004, DEQ received a letter from Agrium and Astaris which indicates that Astaris has transferred ownership of the Dry Valley Mine to Agrium. The companies jointly requested DEQ to recognize the change in ownership and to change the Tier II operating permit to recognize Agrium as the permittee.

4.1 Application Chronology

May 24, 2004	DEQ received notification of the ownership change
June 10, 2004	DEQ initially declared the application was complete
August 11, 2004	DEQ requested supplemental application information from Agrium
December 1, 2004	DEQ received Tier II permit application information
December 30, 2004	DEQ declared the application was complete

February 14, 2005 DEQ issued a draft permit to Agrium for review

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this Tier II permit.

5.1 Equipment List

Boiler

Manufacturer:	Burnham, Model No. 4FW-277-50-GO-PF, Serial No. 21281
Rated Heat Input Capacity:	1.855 MMBtu/hr
Fuel Types:	Distillate oil, used oil, or liquefied petroleum gas (LPG)
Fuel Input Rates:	16.6 gal/hr used oil; 25.3 gal/hr LPG
Stack Parameters	Height - 18 meters
	Diameter - 0.3048 meter
	Flowrate - 914 acfm

Small generators with 10-52 horsepower are moved about for lighting purposes, and these units are exempt under the PTC requirements per IDAPA 58.01.01.222.

5.2 Emissions Inventory

Allowable emissions from the Dry Valley Mine will not change as a result of issuance of this permit to Agrium, the new owner. This is because the permit is being issued for a change of ownership, and no other physical or operational changes will occur as a result of this action. As noted in the March 21, 2002 Tier II Technical Memorandum for this facility, the emissions estimates for the facility have not changed since the April 23, 1997 PTC revision. As part of the application for re-issuance of this permit to Agrium, some additional emission estimate details were provided (e.g., fugitive emission sources). These estimates were reviewed to confirm they are consistent with DEQ methods and procedures and changes were made where necessary. Copies of this information are included in Appendix A. A copy of the crusher emission estimate worksheet is also included in Appendix A and this information represents no changes from what was included with the April 23, 1997 PTC Technical Analysis. In summary, the estimated fugitive dust emissions from the crusher and its associated equipment are 9.5 lb/hr and 11.7 tons/yr. The crusher fugitive dust estimate is based on the permit requirement which limits the total phosphate ore throughput from the haul-truck loadout at the storage pile to the railcar loading to 3,000,000 tons per consecutive 12-month period. For the Burnham Boiler, a summary of the emissions estimates are given below in Table 5.1 and details are included in Appendix A.

Table 5.1 SUMMARY OF BURNHAM BOILER EMISSIONS INVENTORY

Potential Emissions – Hourly (lb/hr), and Annual (T/yr)										
Source Description	PM_{10}		CO		NO_x		SO_2		VOC	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Burnham Boiler, LPG [a]	0.68	0.5	0.09	0.37	0.41	1.79	1.57	6.90	0.02	0.06

[a] For each pollutant, the highest estimated emission rate for either LPG, distillate oil, or used oil was used.

Emissions of toxic air pollutants (TAP) have been estimated for the Burnham Boiler, since it was constructed and/or modified after June 30, 1995, to demonstrate compliance with the PTC requirements of IDAPA 58.01.01.210. TAP emissions from the Burnham Boiler are from the combustion of distillate oil, used oil, and LPG in the 1.85 MMBtu/hr burner. An inventory of the TAPs which were found to exceed the screening emission level (EL) for the boiler are summarized in Table 5.2 and details are provided in Appendix A.

Table 5.2 SUMMARY OF BURNHAM BOILER TAP EMISSION INVENTORY

TAP	Emission Rate (lb/hr)	EL (lb/hr)
Arsenic [a]	9.67E-05	1.5E-06
Cadmium [b]	1.54E-04	3.7E-06
Formaldehyde [c]	5.61E-04	5.1E-04

[a] Maximum emission rate is based on the 0.7 ppm permit limit for arsenic in used oil.
[b] Maximum emission rate is based on used oil combustion.
[c] Maximum emission rate is based on distillate oil combustion.

5.3 Modeling

Since the physical and operational design of the facility are not changed as a result of this permit re-issuance to the new owner, modeling is not required. For convenience, a copy of the SCREEN model conducted for the Burnham Boiler as part of the April 23, 1997 PTC Technical Analysis is included in Appendix B. A copy of the NAAQS modeling results for the Burnham Boiler is also included in Appendix B.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this Tier II permit.

IDAPA 58.01.01.401..... Tier II Operating Permit

This Tier II operating permit is being issued as a result of the change in ownership of the facility.

IDAPA 58.01.01.203, 651..... Permit Requirements - NAAQS, Fugitive Dust

According to IDAPA 58.01.01.403.02, no Tier II operating permit shall be granted unless the applicant shows to the satisfaction of the Department that it would not cause or significantly contribute to a violation of any ambient air quality standard. As indicated above, this permit is being issued for a change in the ownership of the facility. The physical and operational design of the facility are not changed as a result of issuance of this permit, therefore, a NAAQS analysis is not required. However, in the interest of clarifying the NAAQS compliance requirements, the following information is provided.

The requirement for modeling for the demonstration of compliance is determined on a case by case basis. Based on the information presented, DEQ has determined, for this situation, that modeling is not necessary to determine compliance with the NAAQS. DEQ made this decision based on the following information: (1) current PM10 background concentration in the area is low, (2) emission factors for fugitive dust from this source category are somewhat uncertain, (3) model predictions for this type of source are highly uncertain, and require the application of deposition in the model which adds additional uncertainty to the final results. Because of these great uncertainties for this case, DEQ determined it would be more appropriate to require specific fugitive dust control measures in the permit than to perform a modeling analysis. In particular, the permittee is required to develop, implement and maintain a site specific Fugitive Dust Control Plan which contains operating, monitoring and recordkeeping elements. DEQ has determined that these control measures demonstrate, to the satisfaction of DEQ, that this facility would not cause or significantly contribute to a violation of any ambient air quality standard.

For convenience, a copy of the SCREEN model prepared for the Burnham Boiler, and which was attached to the April 23, 1998 PTC Technical Analysis, is included in Appendix B. Also, a copy of the NAAQS modeling results for the Burnham Boiler is included in Appendix B.

IDAPA 58.01.01.203 & 210..... Demonstration of Preconstruction Compliance with Toxic Standards

It has been demonstrated that emissions from the used oil-fired Burnham boiler will comply with IDAPA 58.01.01.210 so long as the used oil requirements specified in the Tier II permit are met. The used oil limits were re-evaluated and changed. In particular, the maximum allowable concentration of arsenic was found to be 2.8 ppm instead of 0.7 ppm and limits for cadmium and chromium which are more stringent than those specified by 40 CFR 279.12 were found to be unnecessary. Compliance is demonstrated as long as the arsenic concentration in used oil does not be exceed 2.8 ppm, the total quantity of used oil combusted does not exceed 22,000 gallons per year and the permittee performs the associated monitoring for these parameters as specified in the permit. The SCREEN modeling conducted for the Burnham Boiler remains effective and unchanged, and a copy is included in Appendix B for convenience. Included in Appendix A are details of the results which demonstrate compliance with IDAPA 58.01.01.210 for the Burnham Boiler.

40 CFR 60, Subpart NN..... New Source Performance Standards (NSPS) for Phosphate Rock Plants

40 CFR Part 60, Subpart NN does not apply to the Dry Valley Mine. Although the Dry Valley Mine meets the definition of a Phosphate Rock Plant, Subpart NN does not apply since the mine does not utilize any of the affected facilities listed in 60.400(a)(2). Details are provided as follows:

As given by 60.400(a)(2), the provisions of this subpart apply to the following affected facilities used in phosphate rock plants which have a maximum plant production capacity greater than 4 tons/hr: dryers, calciners, grinders, and ground rock handling and storage facilities, except those facilities producing or preparing phosphate rock solely for consumption in elemental phosphorus production. Note that the Dry Valley Mine does not utilize any of the affected facilities listed above.

As defined by 60.401(a), a Phosphate Rock Plant is any plant which produces or prepares phosphate rock product by any or all of the following processes: mining, beneficiation, crushing, screening, cleaning, drying, calcining, and grinding. The Dry Valley Mine meets the definition of a Phosphate Rock Plant since it produces/prepares phosphate rock by mining, crushing and screening.

40 CFR 60, Subpart OOO..... NSPS for Nonmetallic Mineral Processing Plants

The provisions of this subpart continue to apply to the crusher at the Dry Valley Mine, and the requirements for complying with these regulations remain in the Tier II permit with no changes.

5.5 *Fee Review*

A Tier II operating permit processing fee of $2,500 shall be paid to DEQ in accordance with IDAPA 58.01.01.407 because the facility's permitted emissions, excluding fugitive emissions, are between 1 and 10 tons per year. The emissions associated with this permit are given in Table 5.3. Although this permit addresses a change in the name of ownership, the fee exception under 58.01.01.407.02 does not apply since additional review and analysis were required for a renewal of the permit.

Table 5.3 TIER II PROCESSING FEE TABLE

Emissions Inventory	
Pollutant	**Permitted Emissions**
NO_X	1.79
SO_2	6.90
CO	0.37
PM_{10}	0.5
VOC	0.06
TAPS/HAPS	0.002
Total:	9.6
Fee Due	**$ 2,500.00**

5.6 *Regional Review of Draft Permit*

A copy of the draft Tier II permit and Statement of Basis were provided to the Pocatello Regional Office on January 14, 2005. Comments were received on January 18, 2005 and they have been incorporated into this draft as noted under Permit Conditions 4.3 and 4.4.

5.7 *Facility Review of Draft Permit*

A copy of the draft PTC and Statement of basis were issued to the facility for review on February 14, 2004. Comments were received from Agrium on March 4, 2005, including corrections to the facility name, plant location, facility description and application scope.

6. PERMIT CONDITIONS

Changes between the Tier II permit issued for the Dry Valley Mine on June 13, 2002 and the Tier II permit proposed for issuance to Agrium, for the change in ownership, are described below. All permit conditions given below refer to the proposed permit for Agrium unless noted otherwise.

Permit Condition 1.2 of the June 13, 2002 Permit

Permit condition 1.2 listed the facility's preceding permits incorporated into the June 13, 2002 permit. This information is not relevant to the facility's new owner, Agrium, therefore, it was not included.

Permit Condition 1.2, Table 1.1, and Permit Condition 3.1

To make it more clear what fuels the Burnham Boiler may combust, distillate oil was added to the description of fuels which may be used.

Permit Conditions 2.1, 2.2, and 2.3

The requirements for complying with the fugitive dust rules under IDAPA 58.01.01.651 are addressed in more detail in the proposed permit. In particular, requirements for a site-specific Fugitive Dust Control (Plan) are specified. It is noted that a Plan to meet those requirements and govern site operations has been provided to DEQ as part of the permit application.

The demonstration of compliance with the fugitive dust rules is enhanced in the proposed permit by conducting monthly facility-wide inspections of potential sources of fugitive dust emissions, during daylight hours and under normal operating conditions, to ensure that the methods used to reasonably

control fugitive dust emissions are effective. In addition, requirements are included for taking corrective actions when necessary and recording the results of the inspections.

Permit Condition 3.4.2

The concentration limit for arsenic was changed from 0.7 to 2.8 ppm and the limits for cadmium and chromium were removed. The compliance demonstration method is still sufficient and was not changed.

Permit Conditions 3.5, 3.6, and 4.6

The requirement to maintain records for five years was changed to be two years. The two-year record retention period is more consistent with Tier II operating permit practices.

Permit Conditions 4.3 and 4.4

The method for demonstrating compliance with the NSPS opacity requirements was changed. Instead of referring to IDAPA 58.01.01.625 or the DEQ procedures manual, opacity shall be determined using the procedures specified in 40 CFR 60.675.

Tier II General Provisions

The most recent version of the Tier II General Provisions was used in this permit.

7. PUBLIC COMMENT

A public comment period on the proposed Tier II operating permit and application materials was provided from March 24, 2005 through April 25, 2005, in accordance with IDAPA 58.01.01.404.01.c. No comments were received.

8. RECOMMENDATION

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue Final Tier II operating permit No. T2-040323 for the Dry Valley Mine in accordance with IDAPA 58.01.01.404.01.c. PSD requirements do not apply.

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APPENDIX A - Emissions Inventory

Agrium, Dry Valley Mine, Burnham Boiler

Emission Estimates From Liquefied Petroleum Gas (LPG)

Fuel Usage (gal/hr) = 25.3

	Emission Factor lb/1000 gallons	lb/hr	TAP Screen lb/hr	Screen Result OK or Model	AAC ug/m3	Modeled ug/m3	Permit Limitations	Ton/yr
PM	0.4	1.01E-02						0.04
PM-10	0.4	1.01E-02						0.04
NOx	14	3.54E-01						1.55
SOx	0.10*S	2.53E-03						0.01
CO	1.9	4.81E-02						0.21
TOC	0.5	1.27E-02						0.06
N2O	0.9	2.28E-02	6	OK	4.50E+03	2.53E-01	no	0.10
CH4	0.2	5.06E-03						0.02

1 lb/hr Modeled Concentration, ug/m3 = 27.8

Sulfur content (grains per 100 cubic feet) = 1

Notes:

1. The 1 lb/hr modeled concentration was obtained from the March 13, 1997 modeling analysis for this boiler.
2. Emission factors are from AP-42 Section 1.5 for commercial boilers burning propane.

Agrium, Dry Valley Mine, Burnham Boiler

Number 2 fuel oil

Firing rate = 17 Gal/hr
% Sulfur (S) = 0.59

Pollutant	Emission Factor lb/1000 gallons	lb/hr	TAP Screen lb/hr	Screen OK?	AAC/C ug/m3	Modeled ug/m3	Permit Limits yes/no	ton/yr
SO2	157*S	1.57						6.90
SO3	5.7*S	0.06						0.25
NOx	24	0.41						1.79
CO	5	0.09						0.37
PM-10	1.08	0.02						0.08
Benzene	2.14E-04	3.64E-06	8.00E-04	OK		1.3E-05		
Ethylbenzene	6.36E-05	1.08E-06	29	OK		3.8E-06		
Formaldehyde	3.30E-02	5.61E-04	5.10E-04	model	7.70E-02	1.9E-03	no	
Naphthalene	1.13E-03	1.92E-05	3.33	OK		6.7E-05		
1,1,1 trichloroethane	2.36E-04	4.01E-06	17.93	OK		1.4E-05		
Toluene	6.20E-03	1.05E-04	25	OK		3.7E-04		
0-Xylene	1.09E-04	1.85E-06	29	OK		6.4E-06		
Acenaphthylene	2.11E-05	3.59E-07				1.2E-06		
Anthracene	1.22E-06	2.07E-08				7.2E-08		
Benz(a)anthracene+	4.01E-06	6.82E-08				2.4E-07		
Benzo(b,k)fluoranthene+	1.48E-06	2.52E-08				8.7E-08		
Benzo(g,h,i)perylene	2.26E-06	3.84E-08				1.3E-07		
Chrysene+	2.38E-06	4.05E-08				1.4E-07		
Dibenzo(a,h)anthracene+	1.67E-06	2.84E-08				9.9E-08		
Fluoranthene	4.84E-06	8.23E-08				2.9E-07		
Fluorene	4.47E-06	7.60E-08				2.6E-07		
Indo(1,2,3-cd)pyrene +	2.14E-06	3.64E-08				1.3E-07		
Phenanthrene	1.05E-06	1.79E-08				6.2E-08		
Pyrene	4.25E-06	7.23E-08				2.5E-07		
Arsenic	5.60E-04	9.5E-06	1.50E-06	model	2.30E-04	3.3E-05	no	
Beryllium	4.20E-04	7.1E-06	2.80E-05	OK		2.5E-05		
Cadmium	4.20E-04	7.1E-06	3.70E-06	model	5.60E-04	2.5E-05	no	
Chromium (+II, III)	4.20E-04	7.1E-06	3.30E-02	OK		2.5E-05		
Copper	8.40E-04	1.4E-05	0.013	OK		5.0E-05		
Lead	1.26E-03	2.1E-05				7.4E-05		
Mercury	4.20E-04	7.1E-06	0.001	OK		2.5E-05		
Manganese	8.40E-04	1.4E-05	0.067	OK		5.0E-05		
Nickel	4.20E-04	7.1E-06				2.5E-05		
Selenium	2.10E-03	3.6E-05	0.013	OK		1.2E-04		
Zinc	5.60E-04	9.5E-06	0.667	OK		3.3E-05		
						0.0E+00		
PAH (Sum of +)		1.9856E-07	2.00E-06	OK		6.9E-07		

1 lb/hr modeled concentration, ug/m3 = 27.8

Notes:
1. Formaldehyde Emission Factor is for #6 but assume #2 Fuel
2. The 1 lb/hr modeled concentration was obtained from the March 13, 1997 modeling analysis for this boiler.
3. All emission factors are from AP-42, Section 1.3

Agrium, Dry Valley Mine, Burnham Boiler

Emission Estimates From Combusting Used Oil

Fuel Usage (gal/hr) =	16.6
Maximum Fuel Usage (hr/yr) =	1,325

	Emission Factor lb/1000 gallons*	lb/hr	TAP Screen lb/hr	Screen Result OK or Model	AAC/C ug/m3	Modeled ug/m3	Permit Limitations	Ton/yr
PM	64*A	0.85						0.56
PM-10	51*A	0.68						0.45
Pb	55*L	0.01						0.01
NOx	19	0.32						0.21
SOx	147*S	1.44						0.95
CO	5	0.08						0.05
TOC	1	0.02						0.01
Antimony		0.00E+00						0.00
Arsenic	1.10E-01	3.87E-04	1.50E-06	Model	2.30E-04	1.34E-03	yes, see below	
Beryllium		0.00E+00	2.80E-05	OK	4.20E-03	0.00E+00	no	
Cadmium	9.30E-03	1.54E-04	3.70E-06	Model	5.60E-04	5.36E-04	no	
Chromium (+II, III)	2.00E-02	3.32E-04	3.30E-02	OK	2.50E+01	3.69E-03	no	
Cobalt	2.10E-04	3.49E-06	3.30E-03	OK	2.50E+00	3.88E-05	no	
Manganese	6.80E-02	1.13E-03	0.067	OK	5.00E+01	1.26E-02	no	
Nickel	1.10E-02	1.83E-04	4.20E-03	OK	4.20E-03	6.35E-04	no	
Phenol	2.80E-05	4.65E-07	1.27	OK	9.50E+02	5.17E-06	no	
Dichlorobenzene		0.00E+00	20	OK	1.50E+04	0.00E+00	no	
Naphthalene	9.20E-05	1.53E-06	3.33	OK	2.50E+03	1.70E-05	no	
Phenanthrene	1.00E-04	1.66E-06					no	
Dibutylphthalate	3.40E-05	5.64E-07	0.333	OK	0.00E+00	6.28E-06	no	

1 lb/hr Modeled Concentration, ug/m3 = 27.8

	%by weight
A = Ash content =	0.8
L = lead content =	0.01015
S = Sulfur content =	0.59

Notes:

1. The 1 lb/hr modeled concentration was obtained from the March 13, 1997 modeling analysis for this boiler.
2. The maiximum hr/yr that used oil can be fired is 1325 hr/yr = 22,000 gal/yr) / (16.6 gal/hr)
3. The arsenic emission rate estimate (3.87 E-04 lb/hr) is based on the permit limit of 2.8 ppm.
4. This table assumes used oil is used 8760 hr/yr at full firing rate & does not account for the 22,000 gal/yr used oil limit.

Therefore, in the permit analysis, the arsenic modeled concentration was adjusted to account for 22,000 gal of used oil-firing (permit limit) and 123,400 gal of distillate oil firing which accounts for the remainder of the year. The resulting permit limit is 2.8ppm for arsenic in used oil.

* TAP emission factors are from AP-42 Section 1.11 for small boilers; for organic compounds atomizing burner factors are used

Maximum Allowable Metal Concentrations for Used Oil Per 40CFR279.12
Maximum Allowable Arsenic Concentration is 2.8 ppm per Tier II Permit Limit

	ppm (mg/l)	lb/gal	Emission Rate(lb/hr) Burning 16.6 gal/hr	Screen Level (lb/hr)
Arsenic	5	4.16E-05	6.91E-04	1.50E-06
Cadmium	2	1.67E-05	2.76E-04	3.70E-06
Chromium	10	8.33E-05	1.38E-03	5.60E-07
Lead	100	8.33E-04	1.38E-02	

Based on the 2.8 ppm Permit Limit for Arsenic

	ppm (mg/l)	lb/gal	Emission Rate(lb/hr) Burning 16.6 gal/hr	Screen Level (lb/hr)
Arsenic	2.8	2.33E-05	**3.87E-04**	1.5E-06

Assume Density of 8.212 lb/gallon
Combustion Rate, gallon/hr = 16.6
mg/l => lb/gal, multiply mg/l by 5.82E-7

From AP-42 for Used Oil

	E.F.	lb/hr	Screen	
Arsenic	1.10E-01	1.83E-03	1.50E-06	Model
Beryllium		0.00E+00	2.80E-05	OK
Cadmium	9.30E-03	**1.54E-04**	3.70E-06	Model
Chromium	2.00E-02	3.32E-04	3.30E-02	OK

Note: for the permit analysis, the smaller of either the AP-42 estimate or the allowable emission rate determined using 279.12 is used, as indicated in bold. The only exception is arsenic in which case the permit limit of 2.8 ppm is used.

Determine maximum allowable Arsenic concentration for used oil:

Arsenic AACC = 2.3 E-04 $\mu g/m^3$

Maximum Hourly Impact = (2.3E-04 $\mu g/m^3$)/0.125 = 1.84E-03 $\mu g/m^3$

Find maximum allowable annual emission rate = X :

$$\frac{1\ lb/hr}{27.8\ \mu g/m^3} = \frac{X}{1.84E\text{-}03\ \mu g/m^3}$$

where 27.8 $\mu g/m^3$ is the modeled impact for the boiler at a 1 lb/hr emission rate.

X = (1.84E-03)/27.8 = 6.62 E-05 lb/hr

Allowable Arsenic emissions = (6.62 E-05 lb/hr)(8760 hr/yr) = 0.580 lb/yr

Find the maximum Arsenic emissions for diesel fuel:

Arsenic emission rate for diesel fuel = 9.5 E-06 lb/hr (see spreadsheet)

Total Fuel fired = (16.6 gal/hr)(8760 hr/yr) = 145,400 gal/yr

used oil fired = 22,000 gal/yr per permit limit

Diesel oil fired = 145,400 gal/yr - 22,000 gal/yr = 123,400 gal/yr

Total annual hours with used oil = (22,000 gal/yr)/(16.6 gal/hr) = 1325 hr/yr

Total annual hours using diesel oil = 8760 - 1325 = 7435 hr/yr

Maximum annual Arsenic emissions for diesel = (9.5E-06 lb/hr)(7435 hr/yr)

= 0.0706 lb/yr

Find the maximum allowable Arsenic concentration for used oil:

Allowable Arsenic Emissions = 0.580 lb/yr = (diesel emissions) + (used oil emissions)

0.580 lb/yr = 0.0706 lb/yr + used oil emissions

Allowable used oil emissions = 0.580 - 0.0706 = 0.509 lb/yr

Allowable used oil emissions = (allowable emission rate)(1325 hr/yr) = 0.509 lb/yr

Allowable emission rate = (0.509 lb/yr)/(1325 hr/yr) = 3.84 E-04 lb/hr

Allowable used oil Arsenic Concentration = [3.84E-04 lb Arsenic/hr]/[(16.6 gal/hr)(8.212 lb/gal)]

= 2.82 E-06 lb As/lb fuel = 2.8 ppm

Determine maximum allowable used oil Cadmium concentration:

Cadmium AACC = 5.6E-04 $\mu g/m^3$

Maximum allowable hourly impact = $(5.6E\text{-}04\ \mu g/m^3)/0.125 = 4.48E\text{-}03\ \mu g/m^3$

Find the maximum allowable emission rate = x :

$X = (4.48\ E\text{-}03)/27.8 = 1.61\ E\text{-}04\ lb/hr$

Allowable cadmium emissions = $(1.61E\text{-}04\ lb/hr)(8760\ hr/yr) = 1.41\ lb/yr$

Maximum annual cadmium emissions for diesel = $(7.1\ E\text{-}06\ lb/hr)(7435\ hr/yr)$

$= 0.0528\ lb/yr$

where the cadmium emission rate for diesel is 7.1E-06 lb/hr (see spreadsheet)

Find the maximum allowable cadmium concentration for used oil:

Allowable cadmium emissions = 1.41 lb/yr = diesel emissions + used oil emissions

$1.41\ lb/yr = 0.0528\ lb/yr$ + used oil emissions

Allowable used oil emissions = $1.41 - 0.0528 = 1.36\ lb/yr$

Allowable cadmium emission rate = $(1.36\ lb/yr)/(1325\ hr/yr) = 1.02\ E\text{-}03\ lb/hr$

"Allowable" used oil cadmium concentration = $[1.02E\text{-}03\ lb/hr]/[(16.6\ gal/hr)(8.212\ lb/gal)]$

$= 7.51E\text{-}06\ lb\text{-cadmium}/lb\text{-fuel} = 7.51\ ppm$

However, since 40 CFR 279.12 limits the cadmium concentration in used oil to no more than 2ppm, then the maximum allowable cadmium concentration shall be 2ppm, and compliance with IDAPA 58.01.01.210 has been demonstrated.

Determine the maximum allowable used oil chromium concentration:

Chromium AAC = $25\ ^{\mu g}/_{m^3}$

Maximum allowable hourly impact = $(25\ ^{\mu g}/_{m^3})/0.4 = 62.5\ ^{\mu g}/_{m^3}$

Find the maximum allowable chromium emission rate = X :

$X = (62.5)/27.8 = 2.25\ ^{lb}/_{hr}$

Allowable chromium emissions = $(2.25\ ^{lb}/_{hr})(8760\ ^{hr}/_{yr}) = 19{,}700\ ^{lb}/_{yr}$

Maximum annual chromium emissions for diesel = $(7.1E\text{-}06\ ^{lb}/_{hr})(7435\ ^{hr}/_{yr})$

$= 0.0528\ ^{lb}/_{yr}$

where the chromium emission rate for diesel is 7.1E-06 lb/hr (see spreadsheet)

Find the maximum allowable chromium concentration for used oil:

Allowable chromium emissions = 19,700 lb/yr = diesel emissions + used oil emissions

$19{,}700\ ^{lb}/_{yr} = 0.0528\ ^{lb}/_{yr}$ + used oil emissions

Allowable used oil emissions = $19{,}700 - 0.0528 = 19{,}700\ ^{lb}/_{yr}$

Allowable chromium emission rate = $(19{,}700\ ^{lb}/_{yr})/(1325\ ^{hr}/_{yr}) = 14.9\ ^{lb}/_{hr}$

Allowable used oil chromium concentration = $[14.9\ ^{lb}/_{hr}]/[(16.6\ ^{gal}/_{hr})(8.212\ ^{lb}/_{gal})]$

$= 1.09E\text{-}01\ ^{lb\ chrome}/_{lb\cdot fuel} = 109{,}000\ ppm$

However, since 40CFR 279.12 limits the chromium concentration in used oil to no more than 10 ppm, then the maximum allowable chromium concentration shall be 10 ppm, and compliance with IDAPA 58.01.01.210 has been demonstrated.

EMISSION ANALYSIS BASED ON APPLICANT'S DATA

Generator Emissions			Applicant's Data		Generator Emissions		Modeled Air Concentrations Based On Entered SCREEN3 Data		
Pollutant	Generator Emission Factor [=] lb/hp-hr	Generator Emission Rate [=] lb/hr	Hours of Operation [=] hr/day	[=] hr/year	Hours of Operation lbs/day	T/yr	Calculated 24-hr Impact [=] ug/m3	Calculated Annual Impact [=] ug/m3	Calculated Annual Impact [=] Other
PM	N/A	0.00	24.0	2,459	0.00	0.00	N/S	N/S	
PM-10	N/A	0.00	24.0	2,459	0.00	0.00	0.0	0.0	
CO	N/A	0.00	24.0	2,459	0.00	0.00	0.0	0.0	0 Du2□
									0 Du3□
NO4 dx□	N/A	0.00	24.0	2,459	0.00	0.00		0.0	
SO4 d2□	N/A	0.00	24.0	2,459	0.00	0.00	0.0	0.0	0 Du4□
TOC	N/A	0.00	24.0	2,459	0.00	0.00			

Generator Emissions	Generator Emissions Regulatory Analysis						Ambient Air Concentrations w/ Background Values (ug/m3)				
Pollutant	BRC Evaluation		Significant Contribution Emission Rates		Non-Attainment Area Significant Contribution Ambient Air Concentration 24-hr	Annual	1-hr	3-hr	8-hr	24-hr	Annual
PM	BRC	(2.5 T/yr)	No	(25 T/yr)							
PM-10	BRC	(1.5 T/yr)	No	(15 T/yr)	No 5 ug/m3	1 ug/m3				99.0	52.7
CO	BRC	(10 T/yr)	No	(100 T/yr)	No 2000 ug/m3 (1-hour)	500 ug/m3 (8-hour)	11,400		5,130		
NO1 dx0	BRC	(4 T/yr)	No	(40 T/yr)							99.0
SO1 d20	BRC	(4 T/yr)	No	(40 T/yr)				543		144.0	23.6
TOC											

Rock Crusher Emissions	Crushers		Screens Du1□		Transfer Points Du2□		Total Emissions	For information purposes: Crusher Hours of Operation to Yield 99.0 T/yr Emissions	
	No. 1		No. 1		Nos. 1 - 4	Nos. 5 - 7		w/o Generator	w/ Generator
No. Units	1	0	1	0	4	3			2459
Throughput ([=] T/hr/unit)	1200	900	1200	900	1200	900			hrs/yr
Operation Schedule ([=] h	24								
Throughput ([=] MM T/yr	2.95	2.21	2.95	2.21	2.95	1.48			
Operation Schedule ([=] h	2,459								
Control Efficiency	70%	70%	70%	70%	70%	70%			
PM-10									
Emission Factor: u3	0.0003	0.0024	0.0150	0.0710	0.0020	0.0020			
Uncontrolled Emission	0.32	0.00	18.00	0.00	9.89	3.83	lb/hr 31.6		
Controlled Emissions	0.10	0.00	5.40	0.00	2.91	1.08	lb/hr 9.5	8760	8760
Uncontrolled Emission	0.4	0.0	22.1	0.0	11.9	4.5	38.9		
Controlled Emissions	0.1	0.0	6.6	0.0	3.6	1.3	T/yr 11.7		
PM									
Emission Factor: u3	0.0007	0.0083	0.0394	0.1864	0.0053	0.0053			
Uncontrolled Emission	0.84	0.00	47.25	0.00	25.80	9.80	83.3		
Controlled Emissions	0.25	0.00	14.18	0.00	7.88	2.88	lb/hr 25.0	7924	7924
Uncontrolled Emission	1.0	0.0	56.1	0.0	31.5	11.8	102.4		
Controlled Emissions	0.3	0.0	17.4	0.0	9.4	3.5	T/yr 30.7		

Notes:
Du1□ Number of Screens = Number of Crushers
Du2□ Number of Transfer Points = 7*(Number of Crushers)
Du3□ Emission Factors from AP-42, Table 11.19.2-2. Where factors were given for one pollutant, the following conversion factors were used:
TSP = PM d10□*2.1; TSP = PM*0.8
Hourly values are based on maximum daily production rates given above. Annual values are based on throughput values given above.

Pollutant	Generator Emissions lb/day	Generator Emissions T/yr	Crusher Emissions (Control lb/day	Crusher Emissions (Control T/yr	Total Emissions lb/day	Total Emissions T/yr
PM	0.00	0.00	599.7	30.7	599.7	30.7
PM-10	0.00	0.00	227.8	11.7	227.8	11.7
CO	0.00	0.00			0.0	0.0
NO7 dx6	0.00	0.00			0.0	0.0
SO7 d26	0.00	0.00			0.0	0.0
TOC	0.00	0.00			0.0	0.0

Enforceable Limits				
Generator – Operation	24.0	hrs/day	2,459	hr/yr
Crusher – Production	26,600	T/hr	2.95	MMT/yr

Crusher fugitive dust estimates

DRY VALLEY MINE EMISSION INVENTORY

Source	TSP Emission Rates			PM10 Emission Rates		
	Actual Annual Emissions (tons/yr)	Potential to Emit		Actual Annual Emissions (tons/yr)	Potential to Emit	
		Hourly (lbs/hr)	Annual (tons/yr)		Hourly (lbs/hr)	Annual (tons/yr)
LPG/Waste Oil Boiler	NA	NA	NA	0.14	0.21	0.14
Generators	NA	NA	NA	6.37	0.32	~~12.76~~ 0.7 KH 1/13/05
Dozers	15.9	13.2	52.6	2.9	2.4	9.6
Blasting and Drilling	9.5	125.3	13.8	4.9	65.1	7.1
Vibratory Screen	2.2	3.8	2.5	0.7	1.3	0.9
Wind Erosion	124.1	39.2	171.8	62.0	19.6	85.8
Scraper Operations	2.9	1.8	4.9	1.9	0.8	2.5
Misc. Sources	80.7	25.5	114.3	25.7	8.5	36.4
Unpaved Roads	275	1,291	352	78	366	100
Total	510	1499	712	183	466	256

This emission inventory presents a conservative estimate of the Dry Valley Mine's pollutant emission rates. Agrium reserves the right to refine these calculations in the future.

ELECTRICAL GENERATORS

✓ KH 1/13/05

Emission Calculations

Operations

	Engine Size (hp)	Number of Generators this Size	Hours of Operation per Day	Days of Operation per Year	Operations Actual (hrs/yr)	Operations Max (hrs/day)	Operations Max (hrs/yr)
Diesel Fired Generators	10	7	12	365	30,660	168	61,320
Diesel Fired Generator	26	1	12	365	4,380	24	8,760
Diesel Fired Generator	52	1	12	365	4,380	24	8,760
Total	147	9			39,420	216	78,840

AP-42 Section 3.3, Table 3.3-1. (10/96)

Criteria Pollutant Emissions from all Generators Combined

Pollutant	Emission Factor (lbs/hp-hr)	Actual Emissions lb/hr	Actual Emissions TPY	Potential to Emit lb/hr	Potential to Emit TPY
PM_{10}	0.0022	0.3	6.4	0.3	~~12.7~~ 0.71
NOx	0.031	4.6	89.8	4.6	~~178.8~~ 10.0
CO	0.00668	1.0	19.4	1.0	~~38.7~~ 2.2
SO_2	~~0.00205~~ 0.0043	0.3	5.9	0.3	~~11.8~~ 1.4
TOC	0.00251	0.4	7.3	0.4	~~14.5~~ 0.81

Toxic Air Pollutant Emissions from all Generators Combined

Pollutant	Emission Factor (lbs/mmbtu)	Emission Factor (lbs/hp-hr)	Actual Emissions lb/hr	Actual Emissions TPY	Potential to Emit lb/hr	Potential to Emit TPY	HAP?
Benzene	0.000933	6.53E-06	9.60E-04	0.019	9.60E-04	3.78E-02	Yes
Toluene	0.000409	2.86E-06	4.21E-04	0.008	4.21E-04	1.66E-02	Yes
Xylenes	2.85E-04	2.00E-06	2.93E-04	0.006	2.93E-04	1.16E-02	Yes
1,3-Butadiene	3.91E-05	2.74E-07	4.02E-05	0.001	4.02E-05	1.59E-03	Yes
Formaldehyde	1.18E-03	8.26E-06	1.21E-03	0.024	1.21E-03	4.79E-02	Yes
Acetaldehyde	7.67E-04	5.37E-06	7.89E-04	0.016	7.89E-04	3.11E-02	Yes
Acrolein	9.25E-05	6.48E-07	9.52E-05	0.002	9.52E-05	3.75E-03	Yes
Polycyclic aromatic hydrocarbons (PAH)							
Naphthalene	8.48E-05	5.94E-07	8.73E-05	0.002	8.73E-05	3.44E-03	Yes
Benzo(a)anthracene	1.68E-06	1.18E-08	1.73E-06	0.000	1.73E-06	6.81E-05	No
Chrysene	3.53E-07	2.47E-09	3.63E-07	0.000	3.63E-07	1.43E-05	No
Benzo(b)fluoranthene	9.91E-08	6.94E-10	1.02E-07	0.000	1.02E-07	4.02E-06	No
Benzo(k)fluoranthene	1.55E-07	1.09E-09	1.59E-07	0.000	1.59E-07	6.29E-06	No
Benzo(a)pyrene	1.88E-07	1.32E-09	1.93E-07	0.000	1.93E-07	7.63E-06	No
Indeno(1,2,3-cd)pyrene	3.75E-07	2.63E-09	3.86E-07	0.000	3.86E-07	1.52E-05	No
Dibenz(a,h)anthracene	5.83E-07	4.08E-09	6.00E-07	0.000	6.00E-07	2.36E-05	No
TOTAL PAH	1.69E-04	1.18E-06	1.73E-04	0.003	1.73E-04	6.81E-03	

PM_{10} Example Correction: $(0.0022\ lb/hp\cdot hr)(175hp)(12\ hr/day)(365\ day/yr)(ton/2000\ lb) = 0.071\ Ton/yr$

SO_2 EF for 0.59% S is 0.0043 lb/hp-hr

12-hr/day operation for lighting units

KH 1-13-05

DOZER MOVEMENT

Emission Calculations

Operations

Type	Number of Dozers	Actual: Hours per Shift	Actual: Shifts per Year per Dozer	Actual: Hours per Year per Dozer	Actual: Hours per Year, All Dozers	Maximum: Hours per Day per Dozer	Maximum: Hours Per Year per Dozer	Maximum: Hours per Year, All Dozers
Ore Dozers	2.5	10	188	1,880	4,700	24	8,760	21,900
Waste Dozers	1.75	10	418	4,180	7,315	24	8,760	15,330
Shipping Dozers	1.5	10	123	1,230	1,845	16	5,840	8,760

Dozer Movement Fugitive Dust Emission Factors

TSP Emission Factor (lb/hr) = $(5.7 * (s)^{1.2}) / (M)^{1.3}$

AP-42 Fifth Edition Table 11.9-1 (7/98)

Equation for Bulldozing Overburden

6.9 = s, material silt content (%), mean value from AP-42 Table 11.9-3

12 = M, material moisture content (%), provided by Agrium

Sample Calculation

EF (lbs TSP/hr of operation) = $(5.7 * (6.9)^{1.2}) / (12.0)^{1.3}$

EF_{TSP} = 2.29 lb/hr

PM10 Emission Factor (lb/hr) = $0.75 * (1.0 * (s)^{1.5}) / (M)^{1.4}$

AP-42 Fifth Edition 11.9-4 (1/95)

Equation for Bulldozing Overburden

0.75 = k, PM10 Scaling Factor

6.9 = s, material silt content (%), mean value from AP-42 Table 11.9-3

12 = M, material moisture content (%), provided by Agrium

Sample Calculation

EF (lbs PM10/hr of operation) = $0.75 * (1.0 * (6.9)^{1.5}) / (12.0)^{1.4}$

EF_{PM10} = 0.42 lb/hr

Fugitive Emissions

Emission Unit	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit: Daily (lbs/hr)	TSP Potential to Emit: Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit: Daily (lbs/hr)	PM10 Potential to Emit: Annual (tons/yr)
Ore Dozers	5.4	5.7	25.1	1.0	1.0	4.6
Waste Dozers	8.4	4.0	17.5	1.5	0.7	3.2
Shipping Dozers	2.1	3.4	10.0	0.4	0.6	1.8
Sum	15.9	13.2	52.6	2.9	2.4	9.6

BLASTING and DRILLING
Emission Calculations

Operations

Type	Type of Material	Actual Blasts per year	Maximum Blasts per hour	Maximum Blasts per year	Annual Holes Drilled per year	Maximum Holes Drilled per hour	Maximum Holes Drilled per year
Blasting	Rock	110	1	160	NA	NA	NA
Drilling	Rock	NA	NA	NA	8,739	7	12,716

Blasting Fugitive Dust Emission Factors

TSP Emission Factor (lbs / blast) = $0.000014 * A^{1.5}$
- AP-42 Fifth Edition 11.9-5 (10/98)

42,066 =A, horizontal area (ft^2), with blasting depth < 70 feet, Provided by Agrium

Sample Calculation
EF(lbs of TSP / blast) = 0.000014 * 42066^1.5
EF_{TSP} = 120.78 lbs / blast

PM10 Emission Factor (lbs / blast) = $0.52 * (0.000014 * A^{1.5})$
- AP-42 Fifth Edition 11.9-5 (10/98)

42,066 =A, horizontal area, with blasting depth < 70 feet, Provided by Agrium
0.52 =k, scaling factor

Sample Calculation
EF(lbs of PM10 / blast) = k* 0.000014 * 42066^1.5
EF_{PM10} = 62.81 lbs / blast

Drilling Fugitive Dust Emission Factors

TSP Emission Factor (lbs / hole) = 1.3
- AP-42 Fifth Edition 11.9-10 (10/98)

EF_{TSP} = 1.3 lbs / hole
EF_{PM10} = 0.65 lbs / hole
We conservatively assumed that half of the TSP emissions associated with Drilling would be PM10.

Fugitive Emissions

Emission Unit	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit Hourly (lbs/hr)	TSP Potential to Emit Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit Hourly (lbs/hr)	PM10 Potential to Emit Annual (tons/yr)
Blasting	8.6	120.8	9.7	3.6	62.8	5.0
Drilling*	2.8	4.8	4.1	1.4	2.3	2.1
Sum	9.5	125.3	13.8	4.9	65.1	7.1

* = Assuming 50% reduction in emissions due to watering controls.

4" VIBRATORY SCREEN

Emission Calculations

Operations

Unit	Type of Material	Number of Units	Actual Annual Throughput (TPY)	Maximum Hourly Throughput (TPH)	Maximum Annual Throughput (TPY)
4" Vibratory Screen	Ore	1	2,000,000	1,728	2,300,000

Throughput information provided by Agrium, 09-08-03

3,000,000 KH 1/13/05

Material Processing Fugitive Dust Emission Factors

TSP Emission Factor (lbs / ton of throughput) = Sum of (Unit EFs * Number of Units)
- AP-42 Fifth Edition 11.19.2 (8/04)

0.0022 =EF for 4" Vibratory Screen (lb / ton)
EF from Table 11.19.2-2 for Controlled Screening due to the material's high moisture content (12%).

PM10 Emission Factor (lbs / ton of throughput) = Sum of (Unit EFs * Number of Units)
- AP-42 Fifth Edition 11.19.2-2 (8/04)

0.00074 =EF for 4" Vibratory Screen (lb / ton)
EF from Table 11.19.2-2 for Controlled Screening due to the material's high moisture content (12%)

Fugitive Emissions

Emission Unit	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit Hourly (lbs/hr)	TSP Potential to Emit Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit Hourly (lbs/hr)	PM10 Potential to Emit Annual (tons/yr)
4" Vibratory Screen	2.2	3.8	2.5	0.7	1.3	0.9

values will be approx 30% higher if throughput is 3,000,000 TPY KH 1-13-05

WIND EROSION ON OPEN AREAS

Emission Calculations

Operations

Type	Actual Acres of Exposed Land	Maximum Acres of Exposed Land
Open Areas	327	452
Roads	24	24

Open Areas Fugitive Dust Emission Factors

TSP Emission Factor (ton / (acre)(yr)) = 0.38
AP-42 Fifth Edition 11.9-4 (10/98)

EF_{TSP} = 0.38 tons / (acre)(yr)

EF_{PM10} = 0.19 tons / (acre)(yr)

We conservatively assumed that half of the TSP emissions associated with Wind Erosion on Open Areas would be PM10.

Fugitive Emissions

Emission Unit	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit Hourly (lbs/hr)	TSP Potential to Emit Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit Hourly (lbs/hr)	PM10 Potential to Emit Annual (tons/yr)
Open Areas	124.1	39.2	171.6	62.0	19.6	85.8
Roads*	0.9	0.2	0.9	0.4	0.1	0.4
Sum	125.0	39.4	172.5	62.5	19.7	86.2

*The Roads emission rates include a 90% control factor due to the water and chemical dust suppressants that Agrium applies to the road surfaces.

SCRAPER OPERATION

Emission Calculations

Operations

Unit	Number of Units	Actual Annual Material Handled (TPY)	Maximum Hourly Material Handled (TPH)	Maximum Annual Material Handled (TPY)
Scraper-Topsoil Removal	1	60,000	16	100,000
Scraper-Unloading	1	60,000	16	100,000

← Basis. 100 TPY

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1-13-05

Miscellaneous Sources Fugitive Dust Emission Factors

Scraper Topsoil Removal Fugitive Dust Emission Factor

TSP Emission Factor (lb / ton) = 0.058
AP-42 Fifth Edition Table 11.9-4 (10/98)

EF_{TSP} = 0.058 lb/ton material removed

Scraper Topsoil Removal PM10 Emission Factor

PM10 Emission Factor (lb / ton) = 0.058 / 2
AP-42 Fifth Edition Table 11.9-4 (10/98)

We conservatively assumed that half of the TSP emissions associated with Scraper Topsoil Removal would be PM10.

EF_{PM10} = 0.029 lb/ton material removed

Scraper Unloading (Batch Drop) Fugitive Dust Emission Factor

TSP Emission Factor (lb / ton) = 0.04
AP-42 Fifth Edition Table 11.9-4 (10/98)

EF_{TSP} = 0.040 lb/ton material unloaded

Scraper Unloading (Batch Drop) PM10 Emission Factor

PM10 Emission Factor (lb / ton) = 0.04 / 2
AP-42 Fifth Edition Table 11.9-4 (10/98)

We conservatively assumed that half of the TSP emissions associated with Scraper Unloading would be PM10.

EF_{PM10} = 0.020 lb/ton material unloaded

Fugitive Emissions

	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit Hourly (lbs/hr)	TSP Potential to Emit Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit Hourly (lbs/hr)	PM10 Potential to Emit Annual (tons/yr)
Scraper-Topsoil Removal	1.7	0.9	2.9	0.9	0.5	1.5
Scraper-Unloading	1.2	0.6	2.0	1.0	0.3	1.0
Sum	2.9	1.5	4.9	1.9	0.8	2.5

MISC DUST SOURCES

Emission Calculations

Operations

Unit	Number of Units	Actual		Maximum	
		Miles Travelled per Year per Grader	Miles Travelled per Year, All Graders	Miles Travelled per Year per Grader	Miles Travelled per Year, All Graders
Graders	2	24,960	49,920	35,407	70,814

VMT information provided by Agrium, 11-19-04

Operations

Unit	Number of Units	Actual Annual Material Handled (TPY)	Maximum Hourly Material Handled (TPH)	Maximum Annual Material Handled (TPY)
Mining Front End Loaders	1	6,025,966	1,342	8,679,721
Shipping Front End Loaders	2	761,905	710	876,190
Steam Shovelling	1	9,540,526	1,796	13,426,250

Miscellaneous Sources Fugitive Dust Emission Factors

Grader Fugitive Dust Emission Factors

TSP Emission Factor (lb / hr) = [k(0.040(S)^2.5)]

AP-42 Fifth Edition Table 11.9-1 (10/98)

Equation for Grading

7.1 =S, mean vehicle speed (mph), mean value from AP-42 Table 11.9-3 for Grader speed

Sample Calculation, Grader

EF (lbs TSP / VMT) = [0.040[7.1^2.5]]

EF_{TSP} = 5.37 lb/VMT

Grader PM10 Emission Factors

PM10 Emission Factor (lb / hr) = [k(0.051(S)2.0]]

AP-42 Fifth Edition Table 11.9-1 (10/98)

Equation for Grading

0.6 =k, PM10 multiplier

7.1 =S, mean vehicle speed (mph), mean value from AP-42 Table 11.9-3 for Grader speed

Sample Calculation, Grader

EF (lbs PM10 / VMT) = k [0.051[7.1^2.0]]

EF_{PM10} = 1.54 lb/VMT

Front End Loader Activity Fugitive Dust Emission Factors

TSP Emission Factor (lb/ton of material handled) = k * (0.0032) * [((U/5)^1.3) / ((M/2)^1.4)]

0.74 = k, PM10 particle size multiplier

9.8 = U, mean wind speed, MPH, from Pocatello, Idaho, collected from Western Region Climate Center

4.8 = M, moisture content of material (%), although the material's moisture content is actually 12%, the moisture content range associated with this equation ends at 4.8 %

Sample Calculations

TSP Emission Factor (lb / ton) = 0.35 * 0.0032 * [((9.8/5)^1.3) / ((4.8/2)^1.4)]

EF_{TSP} = 0.001667 lb / ton of material handled

Front End Loader Activity PM10 Emission Factors

PM10 Emission Factor (lb/ton of material handled) = k * (0.0032) * [((U/5)^1.3) / ((M/2)^1.4)]

13.2.4

0.35 = k, PM10 particle size multiplier

9.8 = U, mean wind speed, MPH, from Pocatello, Idaho, collected from Western Region Climate Center

4.8 = M, moisture content of material (%), although the material's moisture content is actually 12%, the moisture content range associated with this equation ends at 4.8 %

Sample Calculations

PM10 Emission Factor (lb / ton) = 0.35 * 0.0032 * [((9.8/5)^1.3) / ((4.8/2)^1.4)]

EF_{PM10} = 0.000789 lb / ton of material handled

Steam Shovelling Fugitive Dust Emission Factors

TSP Emission Factor (lb/ton of material handled) = k * (0.0032) * [((U/5)^1.3) / ((M/2)^1.4)]

0.74 = k, PM10 particle size multiplier

9.8 = U, mean wind speed, MPH, from Pocatello, Idaho, collected from Western Region Climate Center

4.8 = M, moisture content of material (%), although the material's moisture content is actually 12%, the moisture content range associated with this equation ends at 4.8 %

Sample Calculations

TSP Emission Factor (lb / ton) = 0.35 * 0.0032 * [((9.8/5)^1.3) / ((4.8/2)^1.4)]

EFTSP = 0.001667 lb / ton of material handled

Steam Shoveling PM10 Emission Factors

PM10 Emission Factor (lb/ton of material handled) = k * (0.0032) * [((U/5)^1.3) / ((M/2)^1.4)]

0.35 = k, PM10 particle size multiplier
9.8 = U, mean wind speed, MPH, from Pocatello, Idaho, collected from Western Region Climate Center
4.8 = M, moisture content of material (%), although the material's moisture content is actually 12%, the moisture content range associated with this equation ends at 4.8 %

Sample Calculations

PM10 Emission Factor (lb / ton) = 0.35 * 0.0032 * [((9.8/5)^1.3) / ((4.8/2)^1.4)]

EF_{PM10} = 0.000789 lb / ton of material handled

Fugitive Emissions

	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit		PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit	
		Hourly (lbs/hr)	Annual (tons/yr)		Hourly (lbs/hr)	Annual (tons/yr)
Graders*	87.1	19.1	95.1	19.3	5.5	27.3
Mining Front End Loaders	5.0	2.2	7.2	2.4	1.1	3.4
Shipping Front End Loaders	0.6	1.2	0.7	0.3	0.6	0.3
Shovel	8.0	3.0	11.2	3.8	1.4	5.3
Sum	99.7	25.5	114.3	25.7	8.5	36.4

*The grader emission rates include a 50% control factor due to the water and chemical dust suppressants that Agrium applies to the roads.

ON-SITE UNPAVED ROADS

Emission Calculations

Unpaved Road Fugitive Dust Emission Factors

TSP Emission Factor (lb / VMT) = [k * (s / 12)^{a} * (W/3)^{b}] * [(365-p) / 365]

AP-42 Fifth Edition 13.2.2-5 (12/03)

4.9 =k, TSP multiplier (lb / VMT)
8.4 =s, surface material silt content (%), mean silt content for a haul road at a Western surface coal mine, Table 13.2.2-1
101.56 =W, average weight of the vehicles traveling the road (tons)
0.7 =a, empirical constant
0.45 = b, empirical constant
90 =p, number of days with at least 0.254 mm (0.01 inch) of precipitation per year, from Figure 13.2.2-1

Sample Calculation, Haul Trucks - Waste

EF (lbs TSP / VMT) = [(4.9 * (8.4 / 12)^0.7 * (101.56 / 3)^ 0.45 * [(365 - 90) / 365]

EF_{TSP} = 14.03 lbs / VMT

Unpaved Road PM10 Emission Factors

PM10 Emission Factor (lb / VMT) = [k * (s / 12)^{a} * (W/3)^{b}] / (M_{dry} / 0.2)^{c}] * [(365-p) / 365]

AP-42 Fifth Edition 13.2.2-5 (12/03)

1.5 =k, PM10 multiplier (lb / VMT)
8.4 =s, surface material silt content (%), mean silt content for a haul road at a Western surface coal mine, Table 13.2.2-1
101.56 =W, average weight of the vehicles traveling the road (tons)
0.9 =a, empirical constant
0.45 = b, empirical constant
90 =p, number of days with at least 0.254 mm (0.01 inch) of precipitation per year, from Figure 13.2.2-1

Sample Calculation, Haul Trucks

EF (lbs PM10 / VMT) = [(1.5 * (8.4 / 12)^0.90 * (101.56 / 3)^0.45 * [(365 - 90) / 365]

EF_{PM10} = 4.00 lbs / VMT

Vehicle Miles Traveled, All Relevant Vehicles

Vehicle Type	Average Weight per Vehicle (tons)	Number of Vehicles per Type	VMT/day per Vehicle (VMT)	Actual Operation Days/week	Actual Operation Weeks/yr	Actual Operation VMT/yr, all Vehicles	Maximum Days/yr	Maximum VMT/hr	Maximum VMT/yr
Hydraulic Shovel	200	1	0.1	6	52	31	365	20	37
Hydraulic Backhoe	80	1	0.1	6	52	31	365	20	37
992 Loader	109	2	30	6	52	18,720	365	40	21,900
785 Cat Haul Truck	275	8	50	6	52	124,800	365	160	146,000
Cat 16 Patrol	27	2	30	6	52	18,720	365	40	21,900
Cat D-10 Dozer	72	4	5	6	52	6,240	365	80	7,300
Cat D-9 Dozer	54	1	5	6	52	1,560	365	20	1,825
Cat 825 RTD	51	1	6	6	52	1,872	365	20	2,190
Cat 769 Water Truck	73	1	30	6	36	6,480	365	20	10,950
IR DML Drill	40	1	0.2	6	52	62	365	20	73
Euclid R59 Water truck	70	1	30	5	36	5,400	365	20	10,950
ANFO Truck	15	1	15	6	52	4,680	365	20	5,475
Seeder	1	1	5	1	2	10	365	20	1,825
Chisel plow	1	1	5	1	2	10	365	20	1,825
Lube Truck Ford	10	1	10	6	52	3,120	365	20	3,650
GMC Service Truck	10	3	40	7	52	43,680	365	60	43,800
Link Belt Crane	30	1	0.5	6	52	156	365	20	183
Weststar Lube Truck	37	1	30	6	52	9,360	365	20	10,950
RT100 Forklift	9	1	0.5	6	52	156	365	20	183
Oskosh Snow Plow	12	1	10	2	8	160	365	20	3,650
843 Bobcat	4	1	1	6	52	312	365	20	365
Shuttle Wagon	14	1	3	6	26	468	365	20	1,095
4x4 Pickups	4	8	70	5	52	145,600	365	160	204,400
446 Backhoe	9	1	2	6	52	624	365	20	730
Cat D-7 Dozer	23	1	0.5	5	36	90	365	20	183

			Actual VMT/yr All Vehicles	Maximum VMT All Vehicles VMT/hr	Maximum VMT All Vehicles VMT/yr
Average Vehicle Weight*	101.56	tons			
*Average Weight Weighted by VMT			392,343	920	501,474

Fugitive Emissions

	TSP Actual Annual Emissions (tons/yr)	TSP Potential to Emit Hourly (lbs/hr)	TSP Potential to Emit Annual (tons/yr)	PM10 Actual Annual Emissions (tons/yr)	PM10 Potential to Emit Hourly (lbs/hr)	PM10 Potential to Emit Annual (tons/yr)
All Vehicles	275.3	1,291.0	361.8	78.5	368.0	100.3

These emission rates include a 90% control factor due to watering and chemical dust suppressant application.

Figure 3-4 in EPA document 450/3-88-008, Control of Open Fugitive Dust Sources, indicates that chemical dust suppressants can achieve greater than 90% control by themselves.

APPENDIX B - Modeling Review

Agrium Dry Valley Mine, Burnham Boiler

Ambient Concentrations Micrograms per Cubic Meter
& Relevant NAAQS

	Emission Rate lb/hr	One hour	3 Hour	8 hour	24 hour	annual
NO2	0.41	NA	NA	NA	NA	5.21
NAAQS						100.00
SOx	1.57	NA	73.28	NA	43.46	11.49
NAAQS			1300.00		365.00	80.00
PM-10	0.68	NA	NA	NA	50.56	11.11
NAAQS					150.00	50.00
CO	0.09	3602.50	NA	2301.75	NA	NA
NAAQS		40,000		10,000		

Modeled one hour impact, ug/m3 = 27.8

Example Calculation:
Lead emissions = 0.01 lb/hr (worst case, used oil)
Quarterly modeled impact using a persistence factor of 0.13 is
Pb = (0.01)(27.8 ug/m3)(0.13) = 0.0361 ug/m3
Lead ambient Standard = 1.5 ug/m3 quarterly average; background = 0.03 ug/m3
Therefore, the total estimated impact is 0.0361+0.03= 0.066 ug/m3

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

FMC Dry Valley Mine -- Used Oil Boiler

COMPLEX TERRAIN INPUTS:
SOURCE TYPE = POINT
EMISSION RATE (G/S) = .126000
STACK HT (M) = 18.0000
STACK DIAMETER (M) = .3048
STACK VELOCITY (M/S) = 5.9118
STACK GAS TEMP (K) = 659.0000
AMBIENT AIR TEMP (K) = 293.0000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = RURAL

BUOY. FLUX = .748 M**4/S**3; MOM. FLUX = .361 M**4/S**2.

FINAL STABLE PLUME HEIGHT (M) = 34.5
DISTANCE TO FINAL RISE (M) = 151.3

		VALLEY 24-HR CALCS		**SIMPLE TERRAIN 24-HR CALCS**					
TERR HT (M)	MAX 24-HR DIST (M)	CONC (UG/M**3)	PLUME HT CONC (UG/M**3)	ABOVE STK BASE (M)	CONC (UG/M**3)	PLUME HT ABOVE STK HGT (M)	SC	U10M (M/S)	USTK
19.	350.	21.18	1.356	34.5	21.18	15.8	4	1.0	1.1
49.	401.	3.758	3.758	34.5	.0000	.0	0	.0	.0
60.	468.	3.298	3.298	34.5	.0000	.0	0	.0	.0

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = POINT
EMISSION RATE (G/S) = .126000
STACK HEIGHT (M) = 18.0000
STK INSIDE DIAM (M) = .3048
STK EXIT VELOCITY (M/S)= 5.9118
STK GAS EXIT TEMP (K) = 659.0000
AMBIENT AIR TEMP (K) = 293.0000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = RURAL
BUILDING HEIGHT (M) = 8.2300
MIN HORIZ BLDG DIM (M) = 29.3000
MAX HORIZ BLDG DIM (M) = 65.8300

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 914.00000 (ACFM)

BUOY. FLUX = .748 M**4/S**3; MOM. FLUX = .361 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

** TERRAIN HEIGHT OF 3. M A_OVE STACK BASE USED FOR FOLLO..NG DISTANCES **

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	31.53	.61	.48	NO
100.	22.41	4	3.0	3.3	960.0	20.26	8.34	10.62	HS
200.	21.73	4	2.0	2.2	640.0	22.89	15.73	13.93	HS
300.	20.63	4	1.5	1.6	480.0	25.52	22.81	17.11	HS
400.	18.34	4	1.5	1.6	480.0	25.52	29.61	20.03	HS
500.	15.84	4	1.5	1.6	480.0	25.52	36.27	22.87	HS

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

83.	27.79	6	4.0	5.5	10000.0	19.78	3.75	10.00	HS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
* SUMMARY OF TERRAIN HEIGHTS ENTERED FOR *
* SIMPLE ELEVATED TERRAIN PROCEDURE *
****

TERRAIN HT (M)	DISTANCE RANGE (M) MINIMUM	MAXIMUM
3.	1.	500.

*** CAVITY CALCULATION - 1 *** *** CAVITY CALCULATION - 2 ***
CONC (UG/M**3) = .0000 CONC (UG/M**3) = .0000
CRIT WS @10M (M/S) = 99.99 CRIT WS @10M (M/S) = 99.99
CRIT WS @ HS (M/S) = 99.99 CRIT WS @ HS (M/S) = 99.99
DILUTION WS (M/S) = 99.99 DILUTION WS (M/S) = 99.99
CAVITY HT (M) = 8.36 CAVITY HT (M) = 8.23
CAVITY LENGTH (M) = 38.40 CAVITY LENGTH (M) = 27.13
ALONGWIND DIM (M) = 29.30 ALONGWIND DIM (M) = 65.83

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	27.79	83.	3.
COMPLEX TERRAIN	21.18	350.	19. (24-HR CONC)

APPENDIX C - AIRS INFORMATION

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Agrium, Dry Valley Mine
Facility Location: Soda Springs
AIRS Number: 029-00027

AIR PROGRAM / POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B							U
NO_x	B							U
CO	B							U
PM_{10}	B							U
PT (Particulate)	B		B					U
VOC	B							U
THAP (Total HAPs)	B							U
			APPLICABLE SUBPART					
			OOO					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).